~~Method and Apparatus for Preventing Cargo Spills, filed by and on behalf of Keith A. Robinson~~.

Amended Page 11, Lines 20-26

The Offloading Device is shown in Figures 8 through 11. Particularly in Figure 8, are shown **the compressed capsules 144** for receiving product. A ~~five-way~~ six-way offloading device is depicted in Figures 9 and a parallel offloading device is depicted in Figure 8 and Figure 10. The **offloading troughs 110** which transport the loaded capsules 144 for storage or further deployment are shown in Figure 8 and 10.

Amended Page 14, Lines 12-20

The plates are bolted, riveted or welded to the superstructure of the deck, so that the deck hull-hanging device maximizes the support of the plates while connected to the meso-skeleton. A main **hanging support rod 105** is placed under the deck in the hold and in line with the plates that are on the deck. The rod is connected to each plate via a ~~volt~~ bolt which extends from the rod through the deck, through the plate and is bolted, welded or riveted to the plates. If the plates do not extend the full length of the ship, it is contemplated that two rods would be used within the scope of the present invention within each cargo compartment of the hold. The deck plates that support the hanging support rod are intended to provide weight transfer or load transfer in the vertical plane.

Amended Page 17, Lines 1 to 13

In this invention, if the meso-skeleton structure is installed, the bladder is in place and the cargo or product is placed in the bladder and if the hull of the ship is breached, the following steps in accordance with the present invention occur to prevent cargo contamination into the sea surrounding the ship. First, a deformation of the hull occurs inwardly because of the hull breach. The meso-skeleton is moved, applying pressure uniformly on the bladder. The sensor in the neck of the bladder detects a change in pressure

on the bladder contents and opens the valve. Cargo moves through the valve and is distributed into at least one offloading tube. In the preferred embodiment, ~~five~~ six offloading tubes are contemplated for use with each ship hold that is contained by bulkheads.

Amended Page 22, Lines 10-20

The purpose of the oil overflow containment system is to collect oil that has been evacuated from the bladder system after the inner hull of the tanker has been deformed inward by grounding or a collision. The major components of this system include:

1) Overflow pipes connected to the bladders' necks 140 on one end and to the header pipe on the other end.
2) A large diameter header pipe ~~336~~ 330 deployed on the main deck of the tanker.
3) Multiple iridescent, expandable bags 332 located along the header pipe 330 with a conventional radio beacon/strobe (not illustrated) attached to each for ease of location. Oil evacuated from the bladder(s) in the event of an accident will be contained within the bags 332, which can be, in turn, maintained within the tanker, or deployed and launched into the water for later retrieval.

Amended Page 29 Line 23 to Page 31 Line 20

Because it will be necessary to strip the deck of the ship during the retrofitting of the systems described herein to install the deck portals, which will house bladder nipple extensions, at the time of reinstalling the deck a new projectile resistant deck will be installed as described herein below. The deck in accordance with the invention, is a lightweight, laminated structure as described with respect to Figures 21, 22 and 23. Referring first to Figure 23, the outer surface of the upper deck comprises a metallic layer 800, for example, fabricated from carbon steel, and is preferably several inches thick. Immediately underneath the metallic layer 800 is a thick, belted fabric, material 802, for example, being .5" to 1.0" thick, fabricated from Kevlar, with the layer 802 attached to the outer unit rim. A layer 804 comprises approximately 5 to 7 inches of sodium bicarbonate powder or some other suitable

oxygen scavenger which may simply be comprised of powdered sodium bicarbonate or may be in the form of pillows containing sodium bicarbonate powder described hereinafter with respect to Figure 22. The next layer is layer 806 which is also a thick (.5" to 1.0"), belted fabric interface fabricated, for example, from Kevlar. Immediately beneath the fabric layer 806 is another metallic layer 808, for example fabricated from carbon steel. Passing through the laminated structure of Figure 23 is the pipe section 812 which is used to fill and discharge oil or other liquids from within the bladder 810.

Referring now to Figure 21, there is illustrated in cross-sectional view a portion of a side or bottom of the bladder 810 which has on its exterior surface 813 a first fabric layer ~~808~~ 814, for example, Kevlar, a layer of powdered sodium bicarbonate ~~804~~ 816, ~~the~~ a meso-skeleton layer ~~805~~ 817 disposed within the layer 816, and the second fabric layer ~~802~~ 818, for example, Kevlar. As illustrated in Figure 21, the two fabric layers ~~802~~ 814 and ~~808~~ 818 have between them a layer of the sodium bicarbonate ~~804~~ 816 and the meso-skeleton layer 817. Without some form of intervention, the powdered sodium bicarbonate would drift downwardly causing the layers ~~802~~ 814 and ~~808~~ 818 to come closer together and perhaps even touch. Accordingly, the layers ~~802~~ 814 and ~~808~~ 818 are separated by a plurality of plastic spacers 820 which, if desired, can be spaced along the entire length of the laminate structure illustrated in Figure 21. It should be appreciated that the structure of Figure 21 completely surrounds the bladder 810, other than for its top surface.

As illustrated in Figure 22, an alternative mode for ~~being used as~~ deployment of the oxygen scavenger layers 804 and 816 is illustrated in Figure 21 ~~is the~~ and includes a plurality of ~~sodium bicarbonate~~ pillows 822 which contain sodium bicarbonate powder or another oxygen scavenger, foam, for example, which can be stacked between the layers ~~802~~ 814 and ~~808~~ 818 of Figure 21 in place of the loose, powdered sodium bicarbonate illustrated in Figure 21. This eliminates the need for using the spacers 820.

In summary, by having the structure illustrated in Figure 23 above the top surface of the bladder 810 and by having the structure illustrated in Figures 21 or 22 around the lateral portions of the bladder 810 and beneath the bladder 810, the bladder 810 is thus surrounded

by the laminated structures of Figure 21-23 and serves as a resistance against terrorism on the top surface of the deck, and the structure illustrated in Figures 21 and 22, completely surrounding the bladder 810 beneath the upper structure of the ship's deck, there is an increased resistance to attacks, either in war or as against acts of terrorism involving the use of bombs, missiles, torpedoes, or the like. In this process, a projectile will first encounter the ballistic cloth if it comes in from the side or underneath the bladder and will then engage the sodium bicarbonate. The projectile will then encounter the meso-skeleton itself and then again the fire retardant powder and finally the inner layer of ballistic cloth before gaining access to the containment bladder. Should a fire be involved, the fire retardant, typically an oxygen scavenging powder or foam, will minimize the support of combustion which would otherwise ignite the cargo being transported.